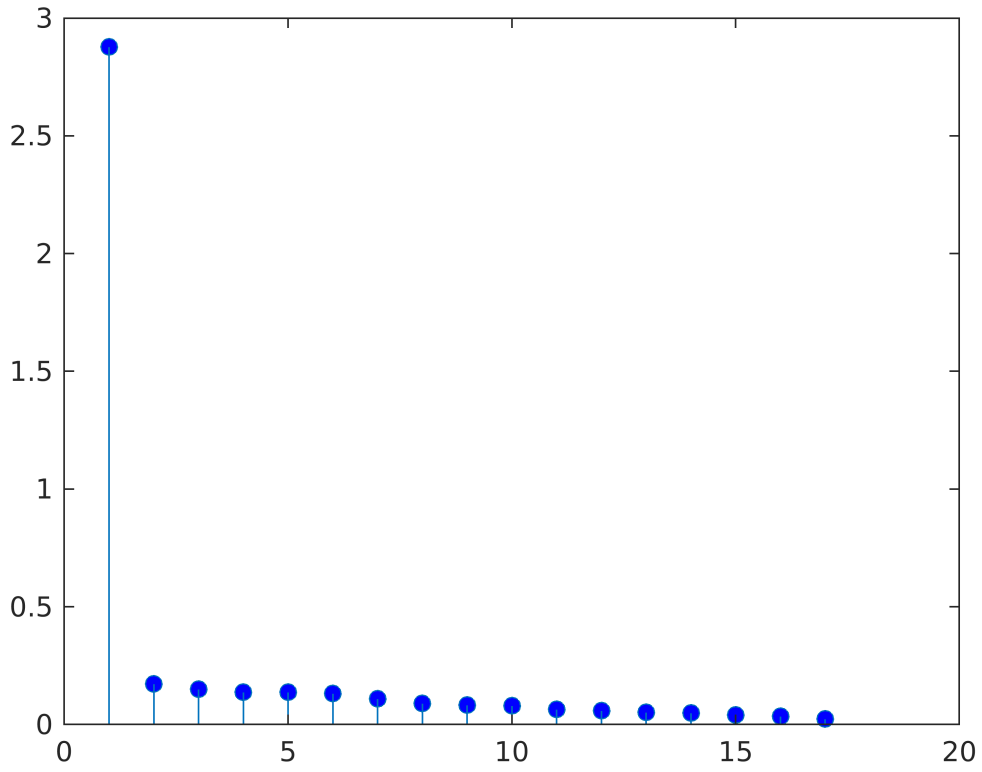
```
load('ircoeffs.mat')

%% Identification
% Hankel matrix and its SVD
Hir = hankel(irvec(2:18), irvec(18:end));
[Uh,Sh,Vh] = svd(Hir,'econ');
% Plot the resulting singular values to guess the order
figure;
stem((1:17), diag(Sh), 'markerfacecolor', 'b')
```




```
% Estimate obsrv and ctrb matrices
nx = 1;
Obnhat = Uh(:,1:nx) * sqrt(Sh(1:nx,1:nx));
Cbnhat = sqrt(Sh(1:nx,1:nx)) * Vh(:,1:nx)';

% Estimate SS matrices
Dhat = 0.0108;  % g[k=0]
Chat = Obnhat(1,:);
Bhat = Cbnhat(:,1);
Ahat = pinv(Obnhat(1:end-1,:)) * Obnhat(2:end,:);

% Reconstruct the TF
Ghat_ss = ss(Ahat,Bhat,Chat,Dhat,1)
```

```
Ghat_ss =

  A =
```

```
          x1
   x1  0.8096

  B =
          u1
   x1  -0.9952

  C =
          x1
   y1  -0.9956

  D =
          u1
   y1  0.0108

Sample time: 1 seconds
Discrete-time state-space model.
```

```
Ghat_tf = tf(Ghat_ss)
```

```
Ghat_tf =

  0.0108 z + 0.982
  ----------------
     z - 0.8096

Sample time: 1 seconds
Discrete-time transfer function.
```

```
[num,den] = tfdata(Ghat_tf,'v');
```